nate such places. The date word immediately follows the address (for date words see page 9, United States Weather Bureau Radiographic Code for vessel weather observers).

The arrangement of the messages are in coded groups, as follows:

Land stations.—Index letters, BBBDF.
Ship reports.—Ship call letters, JQLLL, IIIGG, BBBDF, TTC.
Center of predominating high and low.—Name of station, BBBDF.

MEANING OF SYMBOLS.

BBB=pressure reduced to sea level, in inches (initial figure, 2 or 3, omitted).
D=wind direction on scale 0 to 8, in which 0=calm, 1=N., 2=NE., 3=E., 4=SE., 5=S., 6=SW., 7=W., and 8=NW.
F=wind force in Beaufort scale.
J=day of week, numbered 1 to 7, beginning with Sunday.
Q=quarter of globe in which ship is situated (always in north latitude represented by figure 1, for ship reports included in Angot message).
LLL=latitude in degrees and minutes. The actual minutes are determined by multiplying the third coded figure by 6.
III=longitude in degrees and minutes. Minutes are determined in same manner as for latitude.
TT=temperature in Fahrenheit to nearest even degree.
C=state of sky according to scale, in which 1=clear (three-tenths clouds or less), 2=partly cloudy (four to seven-tenths), 3=cloudy (eight to ten-tenths), 4=raining, 5=snowing, 6=thunderstorms, 7=sleeting, 8=dense fog.

EXAMPLE OF BULLETIN.

Following is an example of a bulletin:

(Address)	ANGOT, PARIS.	
(Date word)	HOODOO.	
(St. Johns, N. F.)	J	02652
(Sydney, N. S.)	S	01264
(Father Point, Can.)	FP	98662
(Parry Sound, Can.)	PN	00000
(White River, Can.)	WR	99800
(Winnipeg, Can.)	WI	99641
(La Pas, Can.)	LP	97861
(Edmonton, Can.)	ED	97081
(Nantucket)	T	00062
(Washington)	WA	00271
(Hatteras)	H	00263
(Charleston)	C	00471
(Bermuda)	B	02852
(Key West)	K	00231
(Little Rock)	LR	00431
(Nashville)	NV	01081
(Cleveland)	V	00441
(Chicago)	CH	00431
(Duluth)	DU	99871
(Huron)	HN	00051
(Salt Lake City)	SLC	97683
(Helena)	HL	98261
(Denver)	DV	99211
(Roseburg)	RO	98481
(Tatoosh Island)	TAT	99453
(San Francisco)	SF	99073
(San Diego)	DI	98681
(Fort Worth)	FW	99411
(El Paso)	EP	98431
(Juneau, Alaska)	JU	99651
(Tanana, Alaska)	TN	98281
(Dutch Harbor, Alaska)	DH	98200

KMI	41389	73819	00021	723
KDE	41392	74119	98800	703
ZTR	41386	74219	00400	723
KEGM	41392	74219	00451	703
(High)	BERMUDA		02852	
(Low)	FATHER		98662	

NOTE.—Words in parenthesis are not transmitted.

The following partial translation will serve to illustrate how the messages are decoded:

HOODOO=29th day of the month, p. m. report.
J 02652: J=St. Johns, N. S.; 02652=(026) sea-level barometer pressure 30.26 inches, (5) winds from S., (2) wind force of 2 in Beaufort scale.

KMI 41389 73819 00021 723: KMI=steamship *Tivires;* 41389=(4) Wednesday, (1) north, (589) latitude 33° 54′; 73819=(738) longitude 75° 48′, (19) time of observation 1900 G. M. T.; 00021=(000) sea-level barometer reading 30.00 inches, (2) wind direction NE., (1) wind force 1 in Beaufort scale; 723=(72) temperature 72° F., (3) state of sky, cloudy.
BERMUDA 02852: Bermuda=Bermuda Islands, the location of nearest reporting station to center of predominating high; 02852=(028) barometer reading 30.28 inches, center of high, (5) wind direction, (2) wind force of 2 in Beaufort scale.
FATHER 98662: Father=Father Point, N. S., the location of nearest reporting station to center of predominating low; 98662=(986) barometer reading nearest center of low, 29.06 inches, (6) wind direction SW., and (2) wind force of 2 in Beaufort scale.

Each evening during a period of more than 25 years the United States Weather Bureau has been furnishing the French Meteorological Service with a bulletin showing current weather from a few stations. The messages formerly were sent by cable. The address "Angot" was utilized because Dr. A. Angot was director of the service. The address was perpetuated in honor of that distinguished meteorologist, who retired several years ago. The bulletin in its present expanded form began in July, 1922, and was the result of arrangements made during a visit to the United States Weather Bureau by Capt. Phillippe Wehrle, Assistant Director of the French Meteorological Service, and Prof. Marcel Coyecque, meteorologist of the French training ship *Jacques Cartier.* These arrangements provide for a daily exchange by radio of European and American meteorological reports, and were made possible by the cooperation of the Office of Communication of the French and American Navy Departments.

The American reports are broadcast from the Eiffel Tower (FL) radio station for the benefit of other European meteorological services and ships in western European waters. The broadcasts from Eiffel Tower are the same in form in which the bulletins are transmitted from the United States and follow immediately after the regular European weather report bulletins, which are transmitted at 11.30 G. M. T., on 2,600 meters, spark, and, in case of a breakdown of the spark apparatus, on 6,500 meters, C. W.

Although the "Angot" bulletins are specially addressed to the French Meteorological Service, they are intended for the general benefit, and shipmasters are at liberty to pick them up during trasnmission from Annapolis to Lyons and to use the information contained therein.

The bulletins containing European reports that were sent by radio to the United States Weather Bureau in exchange have been interrupted for several months. Consequently the time of their transmission and the wave length used is not available for publication herein. An announcement giving the details of this bulletin will be made as soon as the messages are resumed.

WEATHER REPORTS IN SOUTH PACIFIC BY RADIO.

A wireless service for furnishing weather reports to vessels in the South Pacific waters and for studying the course of storms traversing the waters adjacent to the Pacific Islands has been inaugurated by the Navy Department of the New Zealand Government. The attention of all masters of ships is drawn to the importance of their cooperating with the department in reporting at intervals the weather conditions experienced in southern waters, particularly when low barometer readings would indicate the approach of hurricanes, typhoons, etc. It will hereafter be possible for vessels, by intercepting the routine broadcasted reports from New Zealand or Aus-

tralian stations, to ascertain the weather conditions at any place in the waters surrounding the Pacific Islands, New Zealand, and Auatralia.

Primarily this service is given for the benefit of the vessels in these waters, but it is hoped that from the information reported daily to the meteorological stations in New Zealand valuable information and data may be compiled to assist in forecasting weather conditions throughout the South Pacific waters.—*Vice Consul John E. Moran, Wellington, New Zealand.*

SUBMARINE VOLCANO IN THE TONGA GROUP.

ANDREW THOMSON, Acting Director.

[Apia Observatory, Apia, Samoa, July 20, 1923.]

A submarine volcano was sighted on July 1 (eastern time) by Captain Davey, of the Union S. S. passenger liner *Tofua*, about 25 miles east of Tonga Tabu, the main island of the Tonga group.

The geographical position of the volcano was very closely 175° 33′ W., 20° 52′ S. When first sighted, the vapor from the volcano was taken to be the smoke of a passing steamer, but on nearer approach the density and great volume of steam made the true cause evident. The steam column rose to a height of 80 or 90 feet and trailed out like a banner over the ocean for a mile before becoming dissipated. At the level of the ocean the steam column was of the order of 100 feet in diameter. During the time the steam column was visible it remained fixed in size and position. There was marked turbulence and discoloration of the water at the point where the steam issued from the water. It was variously estimated that the water was shot up to a height from 2 to 4 feet above the sea.

The steam column was at the north end of a circular, pale-green area, about one-half mile in diameter. This area was sharply distinguished from the deep blue of the surrounding ocean. The charts give a depth of 550 fathoms for this locality. The volcano is well south of the position indicated on the charts for a volcano active in 1911, and is on the run of steamers from Suva to Nukualofa, the chief port of the Tonga group. There was no indication of volcanic activity when Captain Davey sailed over this position in 1920.

GROUND SURFACE TEMPERATURES AS DEPENDENT ON INSOLATION AND AS CONTROLLING DIURNAL TEMPERATURE UNREST AND GUSTINESS.[1]

By M. ROBITZCH.

[Abstracted from Beitrage zur Physik der freien Atmosphäre, 1921, 9: 1-11.]

From March to June, 1916, continuous observations of the difference in temperature between the surface and a depth of 1.25 m. were made with thermo-elements and a recording galvanometer, in sandy soil without vegetation. Simultaneous records of insolation were also obtained. The closeness of the relation between ground surface temperature and the insolation on a horizontal surface on a day with cumulus clouds is evident from Figure 1. For the general discussion the author chose six bright days in May and June and averaged the values. Figure 2 shows the intensity of insolation normal to the sun's rays and on a horizontal surface. The occurrence at 10 a. m. of the maximum intensity at normal incidence is readily explained as a result of the effect of cumulus clouds in cutting off sunlight intermittently during the following six hours. The diurnal course of insolation on

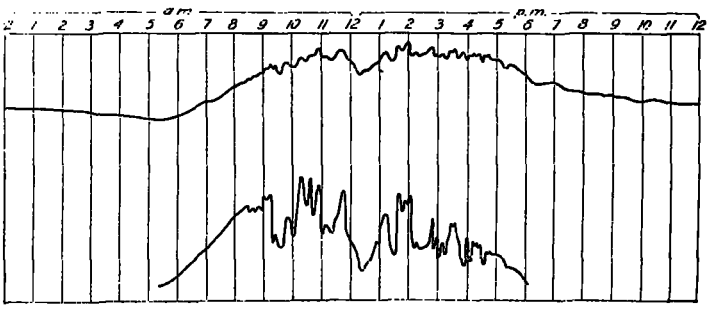

FIG. 1.—Relation between ground surface temperature (upper curve) and insolation on a horizontal surface (lower curve) on a day with cumulus clouds.

the horizontal surface of the ground, and the resulting surface temperature are shown in Figure 3, in which the ordinates have been so adjusted as to make the two curves

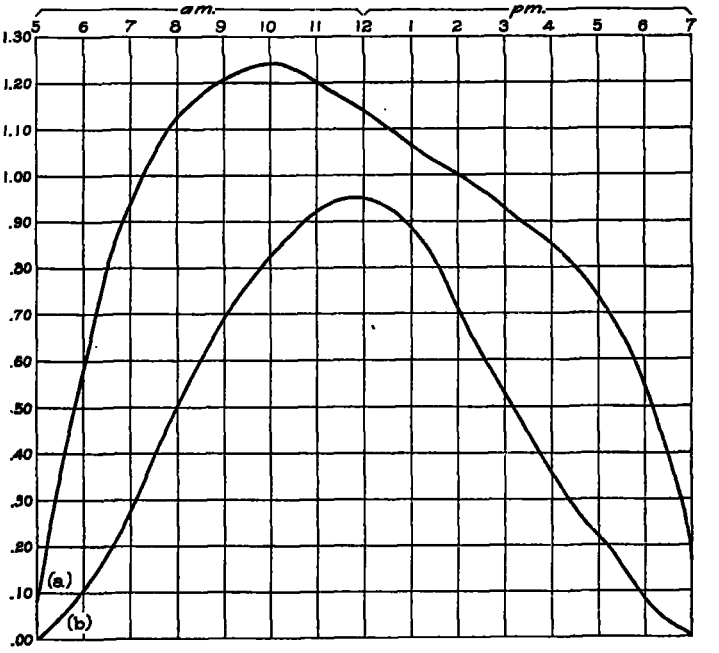

FIG. 2.—Intensity of insolation on a surface normal to the sun's rays (curve *a*) and on a horizontal surface (curve *b*).

cross at the minimum and maximum temperature, where insolation and outgoing radiation are equal. Thus the area ABCD equals CEAF, the former representing the

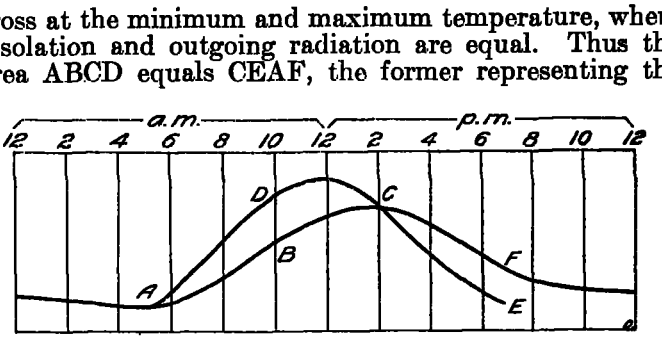

FIG. 3.—Diurnal course of insolation on a horizontal surface (curve *ADCE*) and resulting surface temperature (curve *ABCF*).

heat used in evaporating moisture from the ground and in warming the air, and the latter, the heat received by condensation and by return of heat from the air.

[1] Einige Bezeihungen zwischen der Temperature der Erdoberflache, der Insolation und anderen meteorologischen Faktoren.